L.A.S.
Lima Astronomical Society

STAR GAZER

Night Sky Network
Astronomy clubs bringing the wonders of the universe to the public

Member of the Astronomical League and the NASA Night Sky Network

January 2023

Lima Astronomical Society • PO Box 201 • Lima, OH 45802

Schoonover Observatory • 670 N. Jefferson St. • Lima, OH 45801

CLUB NEWS AND EVENTS

MONTHLY MEETINGS

Board Meeting – January 6 @ 7:00 p.m.
Members Meeting – January 6 @ 800 p.m.
Held at Schoonover Observatory

Program

Lima Astro member, Mark Casazza, will host a program on right ascension and declination in the equatorial celestial coordinate system.

ANNOUNCEMENTS & UPDATES

2023 CLUB OFFICERS

President..... Joshua Crawford
Vice President..... David Humphreys
Treasurer..... Michael Ritchie
Secretary ..... David Humphreys
Cor. Secretary..... Joshua Crawford
Members at Large ..... Doug Wire, Doug Schweizer

CLUB DUES FOR 2023

Current members of the Lima Astronomical Society will **not** be required to pay annual club dues for the 2023 calendar year to retain their membership. Membership dues for next year will be due in January 2024 (Lifetime members excluded). If you do not plan to be an active member in the club, please send us a message, and we will remove you from the active member list.

2023 EVENTS

We're putting together a great events list for this year that we plan on publishing as early as possible. We want you to be able to plan which events you would like to attend, and let you know what we're up to!

UNDER THE DOME

Officer nominations were completed at the December 2023 meeting. All of this year's officers have held previous office within the club. Club officers are members of the Board, and members who held office the previous calendar year retain their membership on the Board for 12-months.

2020 through 2022 were somewhat difficult years for the club. Officers met remotely for a year due to the pandemic. Just before the pandemic began, the motors on the observatory dome began to die, and were replaced just in time for the 2021 Summer observing season. In 2022, things seemed to be getting back to normal and we began looking at some equipment upgrades, and getting back to planning the dark sky observatory at Kendrick Woods. Then disaster struck when we found a burglary had occurred at Schoonover Observatory, and the primary telescope and all accessories had been stolen. The case is still open.

We are overly grateful for the kindness and altruism that has been extended to the club during this time. Many individuals and organizations have donated because they believe in the club's purpose, and the benefit that Schoonover Observatory provides to the local community. Our goal is to get Schoonover back to regular operational status ASAP. We can't wait to hear those first "Ooohs" and "Ahhhs" when someone sees Saturn for the first time, or when one of our long-time members says "it's looking pretty good tonight!".

We hope to see all of our members celebrate astronomy with us this year. We hope you all have a chance to attend events, get to know each other, help us expand our knowledge, and spread the word on this wonderful science and hobby.

Clear Skies

Joshua Crawford
2023 President

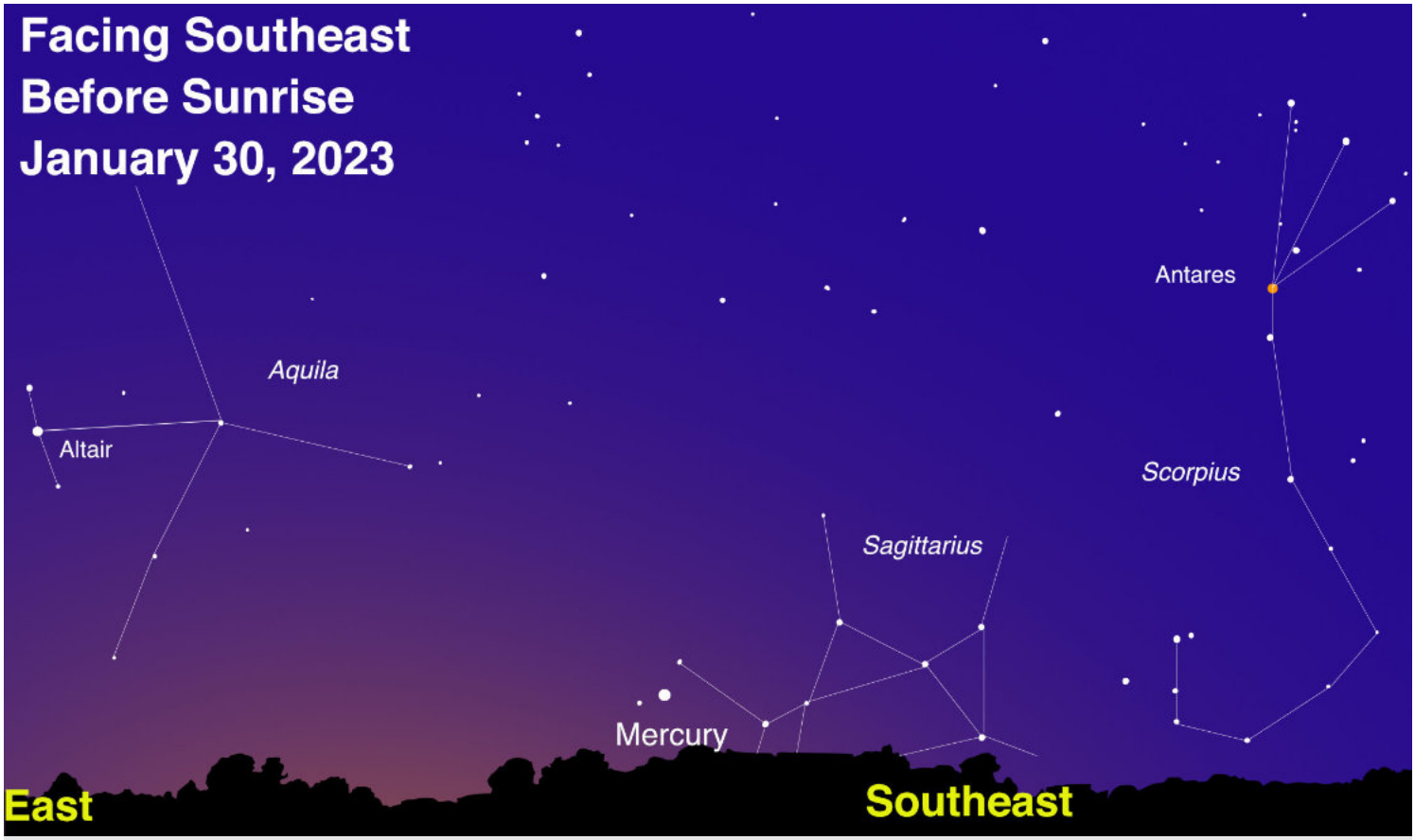
SPOT THE MESSENGER: OBSERVE MERCURY

DAVID PROSPER - NIGHT SKY NETWORK

Most planets are easy to spot in the night sky, but have you spotted Mercury? Nicknamed the Messenger for its speed across the sky, Mercury is also the closest planet to the Sun. Its swift movements close to our Sun accorded it special importance to ancient observers, while also making detailed study difficult. However, recent missions to Mercury have resulted in amazing discoveries, with more to come.

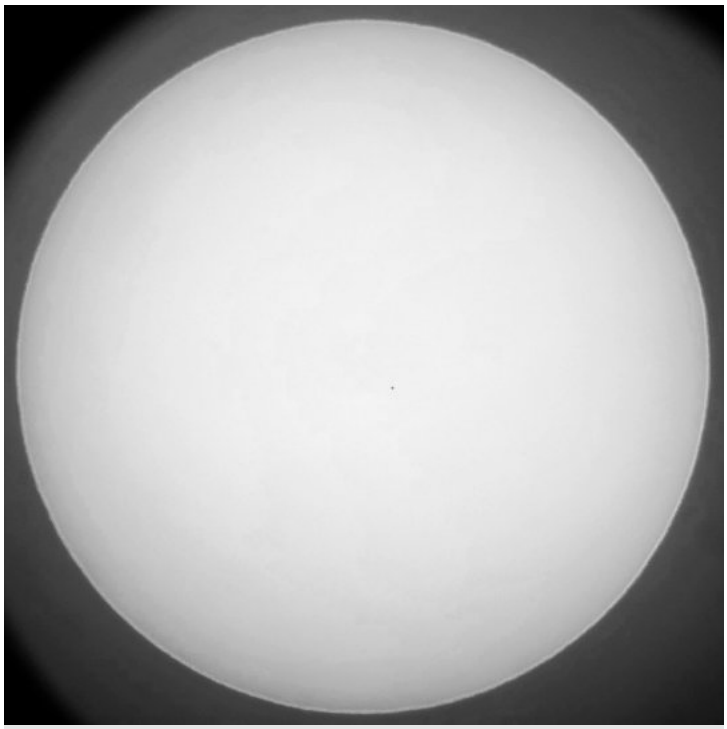
Mercury can be one of the brightest planets in the sky – but also easy to miss! Why is that? Since it orbits so close to the Sun, observing Mercury is trickier than the rest of the "bright planets" in our solar system: Venus, Mars, Jupiter, and Saturn. Mercury always appears near our Sun from our Earth-bound point of view, making it easy to miss in the glare of the Sun or behind small obstructions along the horizon. That's why prime Mercury viewing happens either right before sunrise or right after sunset; when the Sun is blocked by the horizon, Mercury's shine can then briefly pierce the glow of twilight. Mercury often appears similar to a "tiny Moon" in a telescope since, like fellow inner planet Venus, it shows distinct phases when viewed from Earth! Mercury's small size means a telescope is needed to observe its phases since they can't be discerned with your unaided eye. Safety warning: If you want to observe Mercury with your telescope during daytime or before sunrise, **be extremely careful**: you don't want the Sun to accidentally enter your telescope's field of view. As you may already well understand, this is extremely dangerous and can not only destroy your equipment, but permanently blind you as well! That risk is why NASA does not allow space telescopes like Hubble or the JWST to view Mercury or other objects close to the Sun, since even the tiniest error could destroy billions of dollars of irreplaceable equipment.

Despite being a small and seemingly barren world, Mercury is full of interesting features. It's one of the four rocky (or terrestrial) planets in our solar system, along with Earth, Venus, and Mars. Mercury is the smallest planet in our solar system and also possesses the most



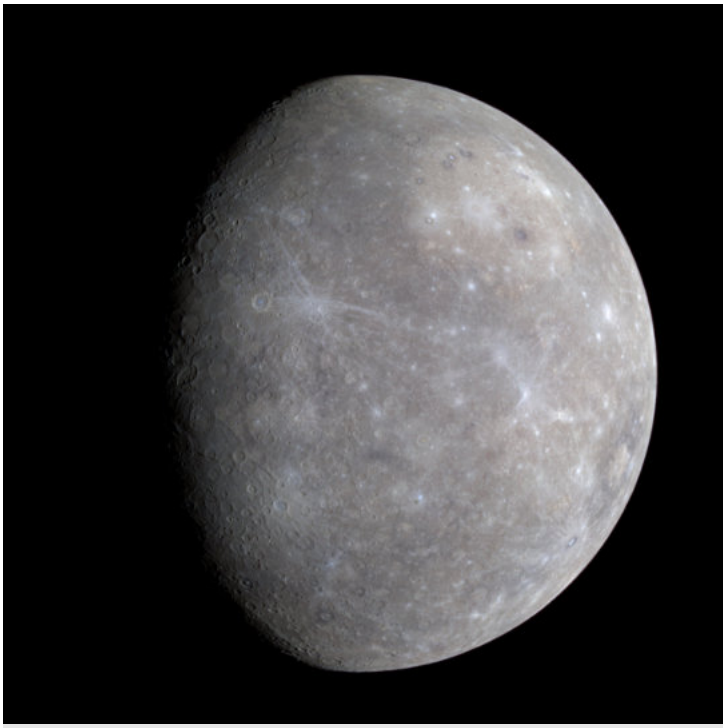
Mercury reaches maximum western elongation on the morning of January 30, which means that your best chance to spot it is right before sunrise that day! Look for Mercury towards the southeast and find the clearest horizon you can. Observers located in more southern latitudes of the Northern Hemisphere have an advantage when observing Mercury as it will be a bit higher in the sky from their location, but it's worth a try no matter where you live. Binoculars will help pick out Mercury's elusive light from the pre-dawn glow of the Sun. Image created with assistance from Stellarium

eccentric, or non-circular, orbit of any planet as well: during a Mercurian year of 88 Earth days, the planet orbits between 29 million and 43 million miles from our Sun – a 14-million-mile difference! Surprisingly, Mercury is **not** the hottest planet in our solar system, despite being closest to the Sun; that honor goes to Venus, courtesy its thick greenhouse shroud of carbon dioxide. Since Mercury lacks a substantial atmosphere and the insulating properties a layer of thick air brings to a planet, its temperature swings wildly between a daytime temperature of 800° F (427° C) and –290° F (–179° C) at night. Similar to our Moon, evidence of water ice is present at Mercury's poles, possibly hiding in the frigid permanent shadows cast inside a few craters. Evidence for ice on Mercury was first detected by radar observations from Earth, and followup observations from NASA's MESSENGER mission added additional strong evidence for its presence. Mercury sports a comet-like tail made primarily of sodium which has been photographed by skilled astrophotographers. The tail results from neutral atoms in its thin atmosphere being pushed away from Mercury by pressure from the nearby Sun's radiation.



On rare occasion, Earthbound observers can observe Mercury, like Venus, transiting the Sun. Mercury frequently travels between Earth and the Sun, but only rarely does the geometry of all three bodies line up to allow observers from Earth to view Mercury's tiny shadow as it crosses our star's massive disc. You can see one such event in this photo taken by Laurie Ansorge of the Westminster Astronomical Society on November 11, 2019. If you missed it, set a reminder for Mercury's next transit: November 13, 2032.

NASA's Mariner 10 was Mercury's first robotic explorer, flying by three times between 1974–1975. Decades later, NASA's MESSENGER first visited Mercury in 2008, flying by three times before settling into an orbit in 2011. MESSENGER thoroughly studied and mapped the planet before smashing into Mercury at mission's end in 2015. Since MESSENGER, Mercury was briefly visited by BepiColombo, a joint ESA/JAXA probe, which first flew by in 2021 and is expected to enter orbit in 2025 - after completing six flybys. Need more Mercury in your life? Check out NASA's discoveries and science about Mercury at solarsystem.nasa.gov/mercury/, and visit the rest of the universe at nasa.gov.



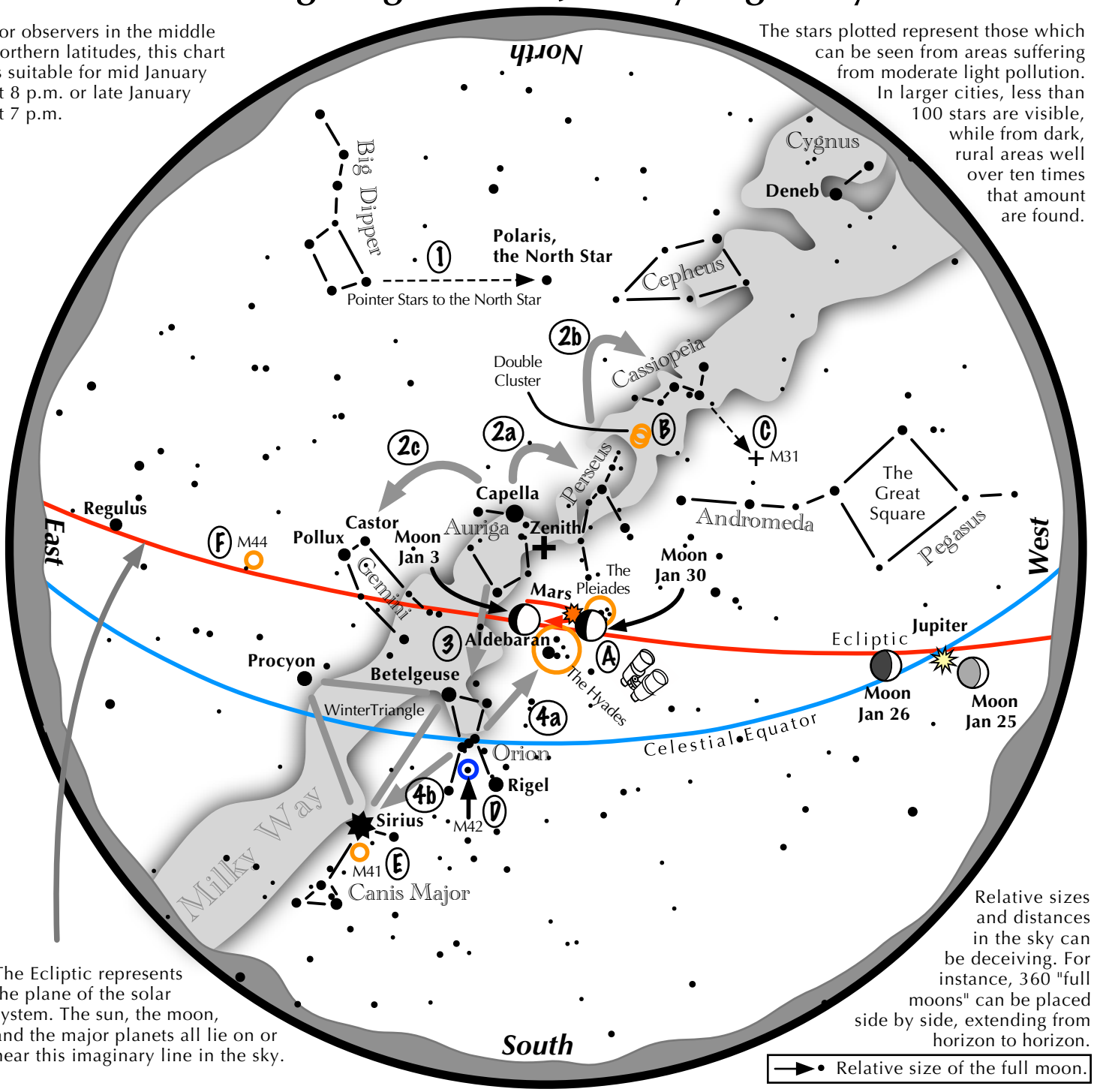
Mercury is hot, small, and heavily cratered across its gray surface, as seen in this image from NASA MESSENGER. Mercury is the most heavily cratered planet in our solar system, since it lacks either a substantial atmosphere or geologic activity to erode surface features like craters - similar in certain aspects to the surface of our own Moon.

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie. Source: https://solarsystem.nasa.gov/resources/439/mercurys-subtle-colors/

Navigating the mid January Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid January at 8 p.m. or late January at 7 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→• Relative size of the full moon.

Navigating the winter night sky: Simply start with what you know or with what you can easily find.

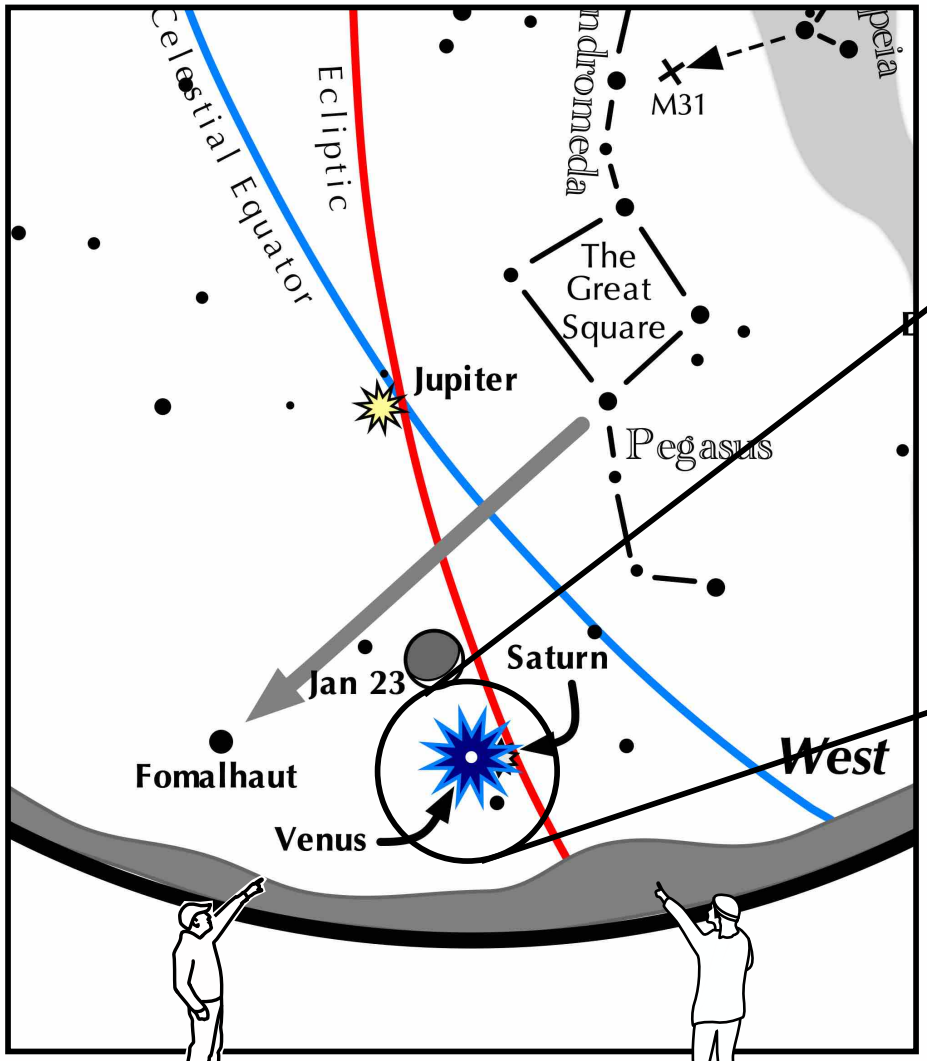
1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next Jump southeastward from Capella to the twin stars Castor and Pollux of Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star, Rigel.
4. Use Orion's three Belt stars to point to the red star Aldebaran, then to the Hyades, and the Pleiades star clusters. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius.

Binocular Highlights

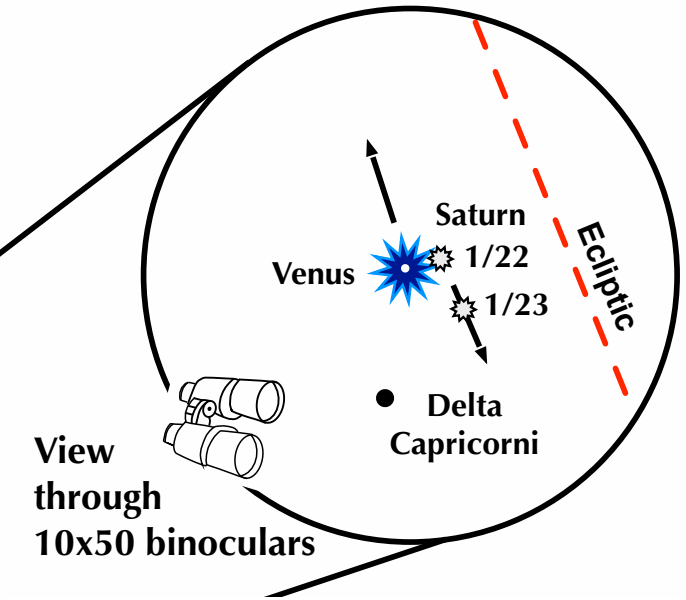
A: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **B:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** M42 in Orion is a star forming nebula. **E:** Look south of Sirius for the star cluster M41. **F:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.

Astronomical League *www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.*

In the early evening of January 22, try this challenge:



View to the west-southwest
on January 22 & 23
45 minutes after sunset



View through 10x50 binoculars

Venus meets Saturn

On January 1, Venus appears very low above the west-southwestern horizon. As the month proceeds, the bright planet climbs higher each evening. Saturn, on the otherhand, begins the month much higher than Venus, and drops closer to the horizon each evening.

On January 22, the two planets reach their closest to each other. Look to the west-southwest 45 minutes after sunset for the pair. Binoculars will help pick Saturn out in the twilight.

On the following evening, the thin crescent moon floats to their upper left, seemingly full with earthshine.

Observing Lists

Top ten deep-sky objects for January	
M 1	M 43
M 36	M 78
M 37	M 79
M 38	NGC 1501
M 42	NGC 2024

Top ten binocular objects for January	
Cr65	M 42
Kemble 1	NGC 1528
M 36	NGC 1647
M 37	NGC 1746
M 38	NGC 1981

Challenge deep-sky object for January
IC 2118 (Witch Head Nebula)
An extremely faint reflection nebula believed to be an ancient supernova remnant or gas cloud illuminated by nearby supergiant star Rigel in the constellation of Orion. Apparent Magnitude: 13.0

The Planets in January

Mercury: Begins 2023 in the evening sky about 13° from the Sun, already in retrograde motion and fading as it falls toward its inferior conjunction on the 7th. Re-emerges in the morning sky around mid-month and gradually extends to greatest western elongation of 25° on the 30th when it will have brightened to mag. 0.0.

Venus: As 2023 begins, Venus is low in the SW in evening twilight, still emerging from its superior conjunction of 10 weeks earlier and set to begin a splendid evening apparition for Northern Hemisphere observers. Over the course of the month, its elongation from the Sun extends from 17° on the 1st to 24° on the 31st, while its declination spikes from –22° to –11°. It has a tight conjunction just 0.4° from Saturn on the 22nd, with the Moon passing 3° to the south of the planet pair just 12 hours later.

Mars: The Red Planet shines brightly high in the east in early evening twilight and remains prominent deep into the overnight hours. Well placed for telescopic observation with a 14.5" disk at 2023 begins. Achieves its second stationary point on the 12th in northern Taurus near the famous Pleiades and Hyades star clusters, then resumes prograde motion thereafter. Fades by over 50% in January, from mag. –1.2 on the 1st to –0.3 on the 31st.

Jupiter: Begins the year in the evening sky some 80° from the Sun, very near the vernal equinox point and far outshining the nearby stars of Pisces. Due south in evening twilight on the 1st, Jupiter will draw into the southwestern sky for the dwindling evenings of this apparition. The waxing crescent Moon passes within 2° on the 25-26.

Saturn: Located in the evening sky in eastern Capricornus, shining at mag. 0.8 some 40° east of the Sun on the 1st. Has a close conjunction just 0.4° from Venus on the 22nd, with Saturn barely 1% as bright as its temporary companion and hard to pick out in evening twilight without optical aid. The thin, waxing crescent Moon is nearby; all three will fit in a single binocular field at favorable longitudes. Fades into the evening twilight before month-end.

Uranus: Well placed for Northern Hemisphere observers in the evening sky nearly 16° north of the celestial equator in the constellation Aries, where it will remain all year. At mag. 5.7, it is visible to the unadided eye from a dark location. Begins the year with a bang, as it is occulted by the Moon on the 29th around 11:00pm EST.

Neptune: Can be found in early evening with optical aid among the stars of extreme northeastern Aquarius, 7° to the southwest of brilliant Jupiter but fully 10 magnitudes fainter.

Historical Astronomical Events This Month

- Galileo Galilei discovered Io, Europa, Callisto, and Ganymede in January 1610.
- Nicolas-Louis de Lacaille discovered the emission nebula NGC 3372 (the Eta Carinae Nebula) on January 25, 1752.
- Charles Messier discovered the globular clusters M56 and M80 in January 1779.
- William Herschel discovered the spiral galaxy NGC 1084 on January 10, 1785.
- Pierre François André Méchain discovered Comet 2P/Encke on January 17, 1786.
- William Herschel discovered Titania and Oberon, two satellites of Uranus, on January 11, 1787.
- Giuseppe Piazzi discovered the first asteroid, 1 Ceres, on January 1, 1801.
- Louis Daguerre took the first photograph of the Moon on January 2, 1839.
- The 36-inch Clark refractor at the Lick Observatory saw first light on January 3, 1888.
- Clyde Tombaugh photographed Pluto on January 23, 1930.
- Mike Brown, Chad Trujillo, and David Rabinowitz discovered Eris on January 5, 2005.

January 2023 Astronomy Events Calendar

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
1  **Uranus 0.7° S of Moon, occultation**	**2**  Mercury at perihelion	**3**  **Mars 0.5° N of Moon**	**4**  **Quadrantid meteors peak** Earth at perihelion	**5** 	**6**  **LAS Meeting @ 8pm** **Double shadows on Jupiter** **Full Moon**	**7**  Mercury in inferior conjunction Pollux 1.9° N of Moon
8  Moon at apogee Pallas at opposition	**9** 	**10** 	**11** 	**12**  Mars stationary	**13**  Mercury at greatest heliocentric lat. N	**14** 
15 	**16**  Moon at descending node	**17**  Venus at greatest heliocentric lat. S	**18**  Mercury stationary	**19** 	**20**  Jupiter at perihelion	**21**  **New Moon** Moon at perigee **Large tides**
22  **Venus 0.4° S of Saturn**	**23**  Uranus stationary Saturn 4° N of Moon **Venus 3° N of Moon**	**24** 	**25**  Neptune 3° N of Moon	**26** 	**27** 	**28**  Moon at ascending node
29  **Uranus 0.9 S of Moon, occultation**	**30**  **Mercury greatest elongation W (25°)**	**31**  **Mars 0.1° N of Moon, occultation**				

ASTRONOMY CALENDAR TERMINOLOGY

Aphelion – The point in the orbit of a planet, asteroid, or comet at which it is furthest from the Sun.

Apogee – The point in the orbit of the Moon, planet, or satellite at which it is furthest from the Earth.

Ascending Node – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from S to N.

Conjunction – When the Moon or a planet appears especially close to another planet or bright star.

Descending Node – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from N to S.

Elongation – The angular distance the Moon or a planet is from the Sun. Mercury and Venus are best seen when at "greatest" elongation, and will appear at their highest position above the horizon before sunrise or sunset.

Heliocentric Latitude – The longitude of a heavenly body, as seen from the Sun's center (the Sun is at the center in the heliocentric model of the solar system). Essentially, if you could stand in the center of the Sun and draw a plane straight out in front of you (this would be 0.0°), heliocentric latitude is the number of degrees above or below that plane where the planet appears.

Inferior Conjunction – When a planet (Mercury or Venus) passes between the Earth and the Sun.

Occultation – When the Moon or a planet passes directly in front of a more distant planet or star. (*Occult, as a verb, means to obscure the view of an object*).

Opposition – When a planet or asteroid is directly *opposite* the Sun in the sky. Just like the Full Moon, a planet will appear brighter and fully lit during this time.

Perigee – the point in the orbit of the Moon, planet, or satellite at which it is nearest to the Earth.

Perihelion – the point in the orbit of a planet, asteroid, or comet at which it is closest to the Sun.

Superior Conjunction – When a planet (Mercury or Venus) passes behind the Sun, out of our view.

Transit – When a smaller object passes in front of a larger object. Such as when Mercury or Venus pass in front of the Sun, silhouetting them against the disc; or when one of Jupiter's Galilean moons pass in front of the planet.

Zodiacal Light – Sunlight that is reflected off celestial dust that is concentrated in the plane of the Solar System. It appears as a faint glow in the sky extending from the horizon in late winter/early spring, and requires the darkest skies to be observed. In the darkest sky conditions, zodiacal light can cast very faint shadows.

Examples

Mars 1.1° S of Moon, occultation

On this night, Mars would appear in the sky very close to the Moon - only 1.1 degrees away from it. At a point during this night the Moon would pass in front of Mars, hiding it from view.

Double shadow transit on Jupiter

On this night, two of Jupiter's Galilean moons will cast shadows on the surface of Jupiter simultaneously, appearing as two dark discs moving across the face of the planet. If you were standing on the surface of Jupiter as one of these shadows passed over, you would witness a solar eclipse.

Mercury greatest elongation E

On this night, Mercury will be at a point in its orbit where it appears highest in the sky. From our point of view, this is the furthest apart Mercury and the Sun will appear from each other. E or W indicate which side of the Sun the planet appears on in its orbital cycle, and can also tell you when to look for Mercury. The planet can be found in the evening sky during the greatest elongation E, and in the morning sky in the greatest elongation W.